4.2 SRS Streams

Five major tributaries of the Savannah River drain the SRS and eventually flow into the Savannah River (Figure 4-25). The five main stream systems that originate on, or flow through, the SRS before flowing into the Savannah River are Upper Three Runs, Beaver Dam Creek, Fourmile Branch, Steel Creek, and Lower Three Runs. A sixth stream, Pen Branch, joins Steel Creek in the Savannah River floodplain swamp.

Upper Three Runs, a relatively deep, fast-flowing blackwater stream, is 24 miles (39 kilometers) long with a 211 square-mile (545 square-kilometer) drainage basin, some of which lies outside the SRS boundary. Beaver Dam Creek is a small, 3-mile- (5-kilometer-) long stream that receives thermal effluent from the D-Area coal-fired powerplant. Fourmile Branch [15 miles (24 kilometers) long; 22 square-mile (57 square-kilometer) drainage basin] received thermal effluent from C-Reactor from 1955 to 1985. Pen Branch [15 miles (24 kilometers) long; 21 square-mile (55 square-kilometer) drainage basin] intermittently received thermal effluent from K-Reactor from 1954 to 1988. Steel Creek [9 miles (15 kilometers) long; 35 square-mile (91 square-kilometer) drainage basin] intermittently received thermal effluent from P- and L-Reactors from 1954 to 1964, and from L-Reactor only from 1964 to 1968. Lower Three Runs is 24 miles (38 kilometers) long with a 178 square-mile (460 square-kilometer) drainage basin; it received thermal effluent from R-Reactor from 1953 until 1958, when its upper reaches were impounded to form Par Pond. These values represent the total area of the drainage basins (Wike et al. 1994). TC

Before the creation of the two cooling reservoirs (Par Pond in 1958; L-Lake in 1985), water temperatures in Steel Creek and Lower Three Runs ranged from 158°F (70°C) at the reactor outfalls to 104°F (40°C) where the streams entered the Savannah River swamp (Bennett and McFarlane 1983). Water temperatures higher than 104°F (40°C) exclude virtually all species of freshwater fish (Coutant 1977) and greatly reduce species number, abundance, and production of aquatic insects (Wiederholm 1984). In addition to thermal stresses, these streams were subjected to high flows that produced erosion upstream and sedimentation downstream, further altering the community structure of aquatic plants, aquatic macroinvertebrates, and fish. Plant and animal communities in Lower Three Runs recovered when DOE built Par Pond which received heated effluent from P- and R-Reactors. Similarly, biological communities in Steel Creek began to recover when DOE placed L-Reactor on standby in 1968.

Each stream has a floodplain characterized by bottomland hardwood forests or scrub-shrub wetlands in varying stages of succession. Dominant species include red maple (*Acer rubrum*), box elder (*A. negundo*), bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), sweetgum (*Liquidambar styraciflua*), and black willow (*Salix nigra*). The Savannah River floodplain swamp covers about 12,148 acres (49 square kilometers) of the Site. Most of the old-growth timber was cut in the swamp in the late 1800s. At present, the swamp forest consists of second-growth bald cypress, black gum (*Nyssa sylvatica*), and other hardwood species (Workman and McLeod 1990).

4.2.1 GEOLOGY AND SOILS

4.2.1.1 Affected Environment

This section describes the character of the geology and soils along SRS streams. The alternatives for the proposed action could affect four streams: Pen Branch, Fourmile Branch, Steel Creek, and Lower Three Runs. Pen Branch, Fourmile Branch, and Steel Creek would be affected by the elimination of river water discharges to these streams. TC

Stratigraphy

The geologic units near or intersecting the SRS streams are as follows (Prowell 1994):

- Pen Branch – The Tobacco Road and Dry Branch Formations are exposed in the stream valley.
- Fourmile Branch – The Tobacco Road and Dry Branch Formations are exposed in the stream valley.
- Lower Three Runs – The Tobacco Road and Dry Branch Formations are exposed in the watersheds.
- Steel Creek – The Tobacco Road Formation outcrops along most of the lower end of L-Lake; the Dry Branch Formation outcrops upstream of the lake and downstream of the dam.

Soils

The more common soil mapping units near SRS streams are listed below and illustrated in Figures 4-7, 4-8, and 4-9 (USDA 1990). TE

- Blanton sand, 0-6 percent slopes (BaB)
- Blanton sand, 6-10 percent slopes (BaC)
- Pickney sand, frequently flooded (Pk)
- Troup sand, 0-6 percent slopes (TrB)
- Troup sand, 10-15 percent slopes (TrD)
- Troup sand, 15-25 percent slopes (TuE)

4.2.1.2 Environmental Impacts

4.2.1.2.1 No Action

There would be no effects from this alternative on Pen Branch, Fourmile Branch, or Lower Three Runs soils or geology. The current rate of erosion or accretion of soils by stream action in Steel Creek below the dam would continue, and there would be no effect on the geology related to this watershed.

4.2.1.2.2 Shut Down and Deactivate

This alternative would affect the soils and geology in the streams because the shut down of the River Water System would discontinue outfall discharges; the presence or absence of water would alter the presence and probably the type of nearby soils (i.e., erosion or accretion). TC Stream conditions downstream of the dam would not change because DOE would regulate the flow rate from the dam as the lake recedes, after which the stream would return to its pre-lake flow rate [estimated to average 10 cubic feet (0.28 cubic meter) per second] (del Carmen and Paller 1993a). In the part of the watershed currently covered by the lake, soil erosion would initially increase along the sides of the Steel Creek stream valley. This erosion should decrease as vegetation reclaims the slopes. Although the area would revegetate naturally, DOE would encourage revegetation by seeding.

There would be no effects on Lower Three Runs. The Par Pond water level would remain near full pool due to groundwater discharge to the reservoir and thereby maintaining the level of discharge into the stream. TE

4.2.1.2.3 Shut Down and Maintain

The impacts discussed above for the Shut Down and Deactivate Alternative would apply to this alternative.

4.2.2 SURFACE WATER

4.2.2.1 Affected Environment

The streams that received heated effluents from the River Water System are Fourmile Branch via Castor Creek, Pen Branch via Indian Grave Branch, Steel Creek, and Lower Three Runs (see Figure 4-25). L10-09 Section 4.2 describes these streams and their watersheds.

In August 1995 DOE prepared an environmental assessment (EA; DOE 1995a) that addressed the impact of reducing the flow from L-Lake to